

**VEER NARMAD SOUTH GUJARAT UNIVERSITY Third Year B. Sc. Semester -V
Chemistry Paper – VI (Inorganic Chemistry) Proposed syllabus from July 2013**

50 Marks (External)

Total : 30 Hrs

20 Marks (Internal)

Time : 2 Hrs. (Uni. Exam)

UNIT – I

Topic –1: Quantum Mechanics:

5 Hrs

Postulates of Quantum mechanics, particles in three dimensional box, Schrodinger's wave equation in polar coordinates, its separation in to R, θ and ϕ .

Topic –2: Boron Hydride:

5 Hrs

Boron hydride and its classification, Wade's Rule Bonding in tetra Borane (10), penta borane (9) and dodeca borane (12) anion.

UNIT – II

Topic –1:

Thermodynamic and Kinetic Aspects of metal complexes:

5 Hrs

A brief out line of thermodynamic stability of metal complexes and factors affecting a stability of metal complexes. Lability and inertness, Factors affecting lability of metal complexes. Trans effect, Theories of Trans effect (i) Electrostatic Polarization Theory (ii) - Bond Theory.

Topic –2:

Bonding in Transition Metal Complexes:

5 Hrs

Jahn Teller Theorem, Distortation in octahedral complexes. Ligand Field Theory. Molecular energy level diagram and magnetic properties for $[\text{CoF}_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{FeF}_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{3-}$

UNIT – III Topic –1: Metal Carbonyls: 5 Hrs

Definition, classification, nature of bonding in metal carbonyls, structure and IR spectra in $\text{Ni}(\text{CO})_4$; $\text{Fe}(\text{CO})_5$, $\text{Fe}_2(\text{CO})_9$, $\text{Mn}_2(\text{CO})_{10}$

. Topic –2: Corrosion and its Protection:

5 Hrs

Definition and importance of corrosion, Types of corrosion : uniform, pitting, intercrystalline and stress cracking corrosion, electro-chemical theory of corrosion. Protection methods: Coating, Inhibitors (Organic, Inorganic, anodic, cathodic), anodic and cathodic protection.

Reference Books:

(1) Introduction to quantum chemistry, by A. K. Chandra, Tata Mc.Graw Hill, Delhi.

- (2) Quantum mechanics in chemistry by M. H. Hanna
- (3) Theoretical Inorganic chemistry by Day & Selbin , Affiliated East West Publ. Pvt. Ltd.
- (4) Advanced Inorganic Chemistry by Cotton and Wilkinson, John Wiley.
- (5) Uni. Chemistry by B. H. Mohan
- (6) Structural Inorganic chemistry by A. F. Wells.
- (7) Chemical Bonding - an introduction By Rawal, Patel & Patel.
- (8) Environmental Chemistry by Amritha anand and Sugumar.
- (9) Basic Inorganic Chemistry by Cotton and Wilkinson (10) A Text book of Inorganic Chemistry by P.L.Soni
- (11) Introduction to Inorganic Chemistry by Durrant and Durrant
- (12) Modern Co-ordination Chemistry by R. Lewis and R.G. Wilkinson.
- (13) Inorganic Chemistry- Principles of structure and reactivity by J.E. Huhhey and E.A. Keiter.
- (14) Application of Group Theory to Chemistry by P.K.Bhattacharya., Himalaya Publishing House, Mumbai.
- (15) Quantum Rasayan, University Granth Nirman Board (Gujarat).
- (16) Environmental Chemistry by A.K. De.
- (17) The corrosion and oxidation of metals by Evans U.R. (1961), Arnold, London.
- (18) Corrosion, Causes and Prevention, Speller. F.,Mc Graw Hill, New York.
- (19) Dhatvik Ksharan, Part-I & II by M.N. Desai, Uni. Granth Nirman Board (Gujarat).
- (20) Corrosion and Corrosion Control, Uhlig H., Wiley.
- (21) Corrosion Engineering by Fontana M.G. and Green N.D., Mc Graw Hill.

VEER NARMAD SOUTH GUJARAT UNIVERSITY Third Year B. Sc.
Semester -VI Chemistry Paper – VI (Inorganic Chemistry)
Proposed syllabus from July 2013

50 Marks (External)

Total : 30 Hrs

20 Marks (Internal)

Time : 2 Hrs. (Uni. Exam)

UNIT – I Topic –1: Molecular Symmetry:

10 Hrs

Introduction and importance of symmetry, Symmetry elements and Symmetry operations, Classification of molecules in to point groups. Point group of simple molecules like CO₂, HCl, H₂O, NH₃, BF₃, [PtCl₄]-2, PF₅, C₆H₆, C₅H₅-, CH₄, SF₆, Cis and Trans - Dichoroethylene (C₂H₂Cl₂), Staggered and Eclipsed Ethane (C₂H₆). Law of multiplications, Construction of multiplication table for C_{2v}, C_{3v}, C_{2h}.

UNIT – II Topic –1: Metal Complexes (Inorganic Reaction Mechanism):

6 Hrs

Reaction mechanisms of ligand substitution in octahedral complexes (i) SN 1 (ii) SN 2 Acid hydrolysis & Base hydrolysis -Redox (Single Electron Transfer) reactions. Topic –2: Hybridization: 4 Hrs Bond angles in sp, sp² and sp³ hybrid orbital using wave function (fully mathematical calculations).

UNIT – III Topic –1: Organo-metallic compounds:

5 Hrs

Definition, classification, Structure and bonding in ferrocene, dibenzene chromium, Zeise ion and gaseous dimethyl beryllium.

Topic –2: water pollution:

5 Hrs

Water pollution: types of water pollutants, Trace elements in water and their effects; Determination of BOD, COD, DO, Total hardness, Total dissolved solids.

Reference Books:

- (1) Introduction to quantum chemistry, by A. K. Chandra, Tata Mc.Graw Hill, Delhi.
- (2) Quantum mechanics in chemistry by M. H. Hanna
- (3) Theoretical Inorganic chemistry by Day & Selbin, Affiliated East West Publ. Pvt. Ltd.
- (4) Advanced Inorganic Chemistry by Cotton and Wilkinson, John Wiley.
- (5) Uni. Chemistry by B. H. Mahan
- (6) Structural Inorganic chemistry by A. F. Wells.
- (7) Chemical Bonding - an introduction By Rawal, Patel & Patel.
- (8) Environmental Chemistry by Amritha anand and Sugumar.

- (9) Basic Inorganic Chemistry by Cotton and Wilkinson
- (10) A Text book of Inorganic Chemistry by P.L.Soni
- (11) Introduction to Inorganic Chemistry by Durrant and Durrant
- (12) Modern Co-ordination Chemistry by R. Lewis and R.G. Wilkinson.
- (13) Inorganic Chemistry- Principles of structure and reactivity by J.E. Huhhey and E.A. Keiter.
- (14) Application of Group Theory to Chemistry by P.K.Bhattacharya., Himalaya Pub. House, Mumbai.
- (15) Quantum Rasayan, University Granth Nirman Board (Gujarat). (
- 16) Environmental Chemistry by A.K. De.
- (17) The corrosion and oxidation of metals by Evans U.R. (1961), Arnold, London.
- (18) Corrosion, Causes and Prevention, Speller. F.,Mc Grqw Hill,New york.
- (19) Dhatvik Ksharan, Part-I & II by M.N. Desai, Uni. Granth Nirman Board (Gujarat).
- (20) Corrosion and Corrosion Control, Uhlig H., Wiley.
- (21) Corrosion Engineering by Fontana M.G. and Green N.D., Mc Graw Hill.